Release notes for ENDF/B Development n-042_Mo_100 evaluation

April 26, 2017

- **checkr** Warnings:

    1. A previous error halted parsing of the current section
       MAT=4249, MF= 1, MT=451 (1): Parsing stopped

       ```
       ERROR(S) FOUND IN MAT=4249, MF= 1, MT=451
           SECTION CANNOT BE CHECKED FROM SEQUENCE NUMBER     200 TO     245
       ```

- **checkr** Errors:

    1. A variable is outside the allowed ENDF range
       MAT=4249, MF= 1, MT=451 (0): Variable range

       ```
       ERROR(S) FOUND IN MAT=4249, MF= 1, MT=451
           MOD =    1 OUT OF RANGE    0 -    0          RECORD NUMBER    200
       ```

    2. Missing a section in directory so your directory is messed up. This error will break everything else
       MAT=4249, MF= 2, MT=151 (0): Directory (b)

       ```
       ERROR(S) FOUND IN MAT=4249, MF= 2, MT=151
           SECTION  2/151 NOT IN DIRECTORY              RECORD NUMBER    247
       ```

    3. Missing a section in directory so your directory is messed up. This error will break everything else
       MAT=4249, MF= 3, MT= 1 (0): Directory (b)

       ```
       ERROR(S) FOUND IN MAT=4249, MF= 3, MT=  1
           SECTION  3/  1 NOT IN DIRECTORY              RECORD NUMBER    419
       ```

    4. Missing a section in directory so your directory is messed up. This error will break everything else
       MAT=4249, MF= 3, MT= 2 (0): Directory (b)

       ```
       ERROR(S) FOUND IN MAT=4249, MF= 3, MT=  2
           SECTION  3/  2 NOT IN DIRECTORY              RECORD NUMBER    459
       ```

    5. Missing a section in directory so your directory is messed up. This error will break everything else
       MAT=4249, MF= 3, MT= 4 (0): Directory (b)

       ```
       ERROR(S) FOUND IN MAT=4249, MF= 3, MT=  4
           SECTION  3/  4 NOT IN DIRECTORY              RECORD NUMBER    499
       ```

    6. Missing a section in directory so your directory is messed up. This error will break everything else
       MAT=4249, MF= 3, MT= 16 (0): Directory (b)

       ```
       ERROR(S) FOUND IN MAT=4249, MF= 3, MT= 16
           SECTION  3/ 16 NOT IN DIRECTORY              RECORD NUMBER    531
       ```

    7. Missing a section in directory so your directory is messed up. This error will break everything else
       MAT=4249, MF= 3, MT= 17 (0): Directory (b)

1

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT= 17
           SECTION  3/ 17 NOT IN DIRECTORY                RECORD NUMBER     548
```

8. Missing a section in directory so your directory is messed up. This error will break everything else
   MAT=4249, MF= 3, MT= 22 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT= 22
           SECTION  3/ 22 NOT IN DIRECTORY                RECORD NUMBER     558
```

9. Missing a section in directory so your directory is messed up. This error will break everything else
   MAT=4249, MF= 3, MT= 28 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT= 28
           SECTION  3/ 28 NOT IN DIRECTORY                RECORD NUMBER     573
```

10. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 3, MT= 51 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT= 51
           SECTION  3/ 51 NOT IN DIRECTORY                RECORD NUMBER     584
```

11. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 3, MT= 52 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT= 52
           SECTION  3/ 52 NOT IN DIRECTORY                RECORD NUMBER     616
```

12. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 3, MT= 53 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT= 53
           SECTION  3/ 53 NOT IN DIRECTORY                RECORD NUMBER     647
```

13. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 3, MT= 54 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT= 54
           SECTION  3/ 54 NOT IN DIRECTORY                RECORD NUMBER     676
```

14. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 3, MT= 55 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT= 55
           SECTION  3/ 55 NOT IN DIRECTORY                RECORD NUMBER     705
```

15. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 3, MT= 56 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT= 56
          SECTION  3/ 56 NOT IN DIRECTORY                    RECORD NUMBER     732
```

16. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 3, MT= 57 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT= 57
          SECTION  3/ 57 NOT IN DIRECTORY                    RECORD NUMBER     759
```

17. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 3, MT= 91 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT= 91
          SECTION  3/ 91 NOT IN DIRECTORY                    RECORD NUMBER     786
```

18. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 3, MT=102 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT=102
          SECTION  3/102 NOT IN DIRECTORY                    RECORD NUMBER     812
```

19. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 3, MT=103 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT=103
          SECTION  3/103 NOT IN DIRECTORY                    RECORD NUMBER     848
```

20. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 3, MT=104 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT=104
          SECTION  3/104 NOT IN DIRECTORY                    RECORD NUMBER     866
```

21. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 3, MT=105 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT=105
          SECTION  3/105 NOT IN DIRECTORY                    RECORD NUMBER     878
```

22. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 3, MT=107 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 3, MT=107
          SECTION  3/107 NOT IN DIRECTORY                    RECORD NUMBER     890
```

23. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 4, MT= 2 (0): Directory (b)

```
      ERROR(S) FOUND IN MAT=4249, MF= 4, MT=  2
        SECTION  4/  2 NOT IN DIRECTORY                RECORD NUMBER     913
```

24. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 4, MT= 16 (0): Directory (b)

```
      ERROR(S) FOUND IN MAT=4249, MF= 4, MT= 16
        SECTION  4/ 16 NOT IN DIRECTORY                RECORD NUMBER    1376
```

25. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 4, MT= 17 (0): Directory (b)

```
      ERROR(S) FOUND IN MAT=4249, MF= 4, MT= 17
        SECTION  4/ 17 NOT IN DIRECTORY                RECORD NUMBER    1421
```

26. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 4, MT= 22 (0): Directory (b)

```
      ERROR(S) FOUND IN MAT=4249, MF= 4, MT= 22
        SECTION  4/ 22 NOT IN DIRECTORY                RECORD NUMBER    1440
```

27. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 4, MT= 28 (0): Directory (b)

```
      ERROR(S) FOUND IN MAT=4249, MF= 4, MT= 28
        SECTION  4/ 28 NOT IN DIRECTORY                RECORD NUMBER    1481
```

28. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 4, MT= 51 (0): Directory (b)

```
      ERROR(S) FOUND IN MAT=4249, MF= 4, MT= 51
        SECTION  4/ 51 NOT IN DIRECTORY                RECORD NUMBER    1506
```

29. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 4, MT= 52 (0): Directory (b)

```
      ERROR(S) FOUND IN MAT=4249, MF= 4, MT= 52
        SECTION  4/ 52 NOT IN DIRECTORY                RECORD NUMBER    1748
```

30. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 4, MT= 53 (0): Directory (b)

```
      ERROR(S) FOUND IN MAT=4249, MF= 4, MT= 53
        SECTION  4/ 53 NOT IN DIRECTORY                RECORD NUMBER    1845
```

31. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 4, MT= 54 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 4, MT= 54
           SECTION  4/ 54 NOT IN DIRECTORY                   RECORD NUMBER    2057
```

32. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 4, MT= 55 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 4, MT= 55
           SECTION  4/ 55 NOT IN DIRECTORY                   RECORD NUMBER    2241
```

33. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 4, MT= 56 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 4, MT= 56
           SECTION  4/ 56 NOT IN DIRECTORY                   RECORD NUMBER    2433
```

34. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 4, MT= 57 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 4, MT= 57
           SECTION  4/ 57 NOT IN DIRECTORY                   RECORD NUMBER    2512
```

35. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 4, MT= 91 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 4, MT= 91
           SECTION  4/ 91 NOT IN DIRECTORY                   RECORD NUMBER    2694
```

36. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 5, MT= 16 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 5, MT= 16
           SECTION  5/ 16 NOT IN DIRECTORY                   RECORD NUMBER    2770
```

37. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 5, MT= 17 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 5, MT= 17
           SECTION  5/ 17 NOT IN DIRECTORY                   RECORD NUMBER    2970
```

38. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 5, MT= 22 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 5, MT= 22
           SECTION  5/ 22 NOT IN DIRECTORY                   RECORD NUMBER    3040
```

39. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 5, MT= 28 (0): Directory (b)

5

```
        ERROR(S) FOUND IN MAT=4249, MF= 5, MT= 28
            SECTION  5/ 28 NOT IN DIRECTORY                    RECORD NUMBER    3213
```

40. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF= 5, MT= 91 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF= 5, MT= 91
            SECTION  5/ 91 NOT IN DIRECTORY                    RECORD NUMBER    3306
```

41. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF=33, MT= 1 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF=33, MT=  1
            SECTION 33/  1 NOT IN DIRECTORY                    RECORD NUMBER    3612
```

42. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF=33, MT= 2 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF=33, MT=  2
            SECTION 33/  2 NOT IN DIRECTORY                    RECORD NUMBER    3840
```

43. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF=33, MT= 4 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF=33, MT=  4
            SECTION 33/  4 NOT IN DIRECTORY                    RECORD NUMBER    4068
```

44. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF=33, MT= 16 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF=33, MT= 16
            SECTION 33/ 16 NOT IN DIRECTORY                    RECORD NUMBER    4183
```

45. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4249, MF=33, MT=102 (0): Directory (b)

```
        ERROR(S) FOUND IN MAT=4249, MF=33, MT=102
            SECTION 33/102 NOT IN DIRECTORY                    RECORD NUMBER    4205
```

- psyche   Warnings:

  1. Non-threshold reaction with Q value differing from PSYCHE's expectations
     FILE 3 / SECTION 107 / THE CALCULATED Q 1.88453E+06 DISSAGREES WITH THE GIVEN Q 2.41070E+06 (0): Iffy Q

```
        FILE  3
          SECTION 107
                    THE CALCULATED Q  1.88453E+06 DISSAGREES WITH THE GIVEN Q  2.41070E+06
```

- groupie   Errors:

1. Very small elastic cross section found
   0: Small elastic

   ```
   Multi-Group and Multi-Band Parameters from ENDF/B Data (GROUPIE 2015-2)
   -----------------------------------------------------------------------
   ENDF/B Input and Output Data Filenames
   ENDFB.IN
   ENDFB.OUT
   ... [97 more lines]
   ```

- `fudge-4.0`   Warnings:

  1. Missing a channel with a particular angular momenta combination
     resonances / resolved / MultiLevel_BreitWigner (Error # 0): missingResonanceChannel

     ```
     WARNING: Missing a channel with angular momenta combination L = 0, J = 1.5 and S = 1.5 for "capture"
     WARNING: Missing a channel with angular momenta combination L = 1, J = 0.5 and S = 1.5 for "capture"
     WARNING: Missing a channel with angular momenta combination L = 1, J = 1.5 and S = 1.5 for "capture"
     WARNING: Missing a channel with angular momenta combination L = 1, J = 2.5 and S = 1.5 for "capture"
     ```

  2. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
     Section 0 (total): / Form 'eval': / Component 0 (Error # 0): Condition num.

     ```
     WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
     ```

  3. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
     Section 0 (total): / Form 'eval': / Component 1 (Error # 0): Condition num.

     ```
     WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
     ```

  4. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
     Section 1 (n + Mo100): / Form 'eval': / Component 0 (Error # 0): Condition num.

     ```
     WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
     ```

  5. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
     Section 1 (n + Mo100): / Form 'eval': / Component 1 (Error # 0): Condition num.

     ```
     WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
     ```

  6. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
     Section 2 ((z,n)): / Form 'eval': (Error # 0): Condition num.

     ```
     WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
     ```

  7. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
     Section 3 (n[multiplicity:'2'] + Mo99): / Form 'eval': (Error # 0): Condition num.

     ```
     WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
     ```

8. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
   Section 4 (Mo101 + gamma): / Form 'eval': / Component 0 (Error # 0): Condition num.

   ```
   WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
   ```

9. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
   Section 4 (Mo101 + gamma): / Form 'eval': / Component 1 (Error # 0): Condition num.

   ```
   WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
   ```

- `fudge-4.0` Errors:

   1. Calculated and tabulated Q values disagree.
      reaction label 9: n[multiplicity:'2'] + Mo99 (Error # 0): Q mismatch

      ```
      WARNING: Calculated and tabulated Q-values disagree: -8500392.341552734 eV vs -8.2905e6 eV!
      ```

   2. Calculated and tabulated Q values disagree.
      reaction label 10: n[multiplicity:'3'] + Mo98 (Error # 0): Q mismatch

      ```
      WARNING: Calculated and tabulated Q-values disagree: -14425826.003479 eV vs -1.4217e7 eV!
      ```

   3. Calculated and tabulated Q values disagree.
      reaction label 11: n + H1 + Nb99 (Error # 0): Q mismatch

      ```
      WARNING: Calculated and tabulated Q-values disagree: -11356931.85481262 eV vs -1.1147e7 eV!
      ```

   4. Calculated and tabulated Q values disagree.
      reaction label 12: Mo101 + gamma (Error # 0): Q mismatch

      ```
      WARNING: Calculated and tabulated Q-values disagree: 5187633.677841187 eV vs 5.3982e6 eV!
      ```

   5. Calculated and tabulated Q values disagree.
      reaction label 13: n + He4 + Zr96 (Error # 0): Q mismatch

      ```
      WARNING: Calculated and tabulated Q-values disagree: -3377039.466903687 eV vs -3.1692e6 eV!
      ```

   6. Calculated and tabulated Q values disagree.
      reaction label 14: H1 + Nb100_s (Error # 0): Q mismatch

      ```
      WARNING: Calculated and tabulated Q-values disagree: -5673260.952331543 eV vs -5.4744e6 eV!
      ```

   7. Calculated and tabulated Q values disagree.
      reaction label 15: H2 + Nb99_s (Error # 0): Q mismatch

      ```
      WARNING: Calculated and tabulated Q-values disagree: -9132365.753875732 eV vs -8.9228e6 eV!
      ```

   8. Calculated and tabulated Q values disagree.
      reaction label 16: H3 + Nb98_s (Error # 0): Q mismatch

      ```
      WARNING: Calculated and tabulated Q-values disagree: -9744857.387374878 eV vs -9.5371e6 eV!
      ```

9. Calculated and tabulated Q values disagree.
   reaction label 17: He4 + Zr97_s (Error # 0): Q mismatch

   ```
   WARNING: Calculated and tabulated Q-values disagree: 2198131.940475464 eV vs 2.4107e6 eV!
   ```

- `njoy2012` Warnings:

   1. With the advent of the ENDF-6 format, it is possible to make evaluations that fully describe all the products of a nuclear reaction. Some carry-over evaluations from earlier ENDF/B versions also have this capability, but many do not. This message is intended to goad evaluators to improve things!
      groupr...compute self-shielded group-averaged cross-sections (0): GROUPR/conver (0)

      ```
      ---message from conver---cannot do complete particle production for mt= 16
                       only mf4/mf5 provided
      ```

   2. With the advent of the ENDF-6 format, it is possible to make evaluations that fully describe all the products of a nuclear reaction. Some carry-over evaluations from earlier ENDF/B versions also have this capability, but many do not. This message is intended to goad evaluators to improve things!
      groupr...compute self-shielded group-averaged cross-sections (1): GROUPR/conver (0)

      ```
      ---message from conver---cannot do complete particle production for mt= 17
                       only mf4/mf5 provided
      ```

   3. With the advent of the ENDF-6 format, it is possible to make evaluations that fully describe all the products of a nuclear reaction. Some carry-over evaluations from earlier ENDF/B versions also have this capability, but many do not. This message is intended to goad evaluators to improve things!
      groupr...compute self-shielded group-averaged cross-sections (2): GROUPR/conver (0)

      ```
      ---message from conver---cannot do complete particle production for mt= 22
                       only mf4/mf5 provided
      ```

   4. With the advent of the ENDF-6 format, it is possible to make evaluations that fully describe all the products of a nuclear reaction. Some carry-over evaluations from earlier ENDF/B versions also have this capability, but many do not. This message is intended to goad evaluators to improve things!
      groupr...compute self-shielded group-averaged cross-sections (3): GROUPR/conver (0)

      ```
      ---message from conver---cannot do complete particle production for mt= 28
                       only mf4/mf5 provided
      ```

   5. With the advent of the ENDF-6 format, it is possible to make evaluations that fully describe all the products of a nuclear reaction. Some carry-over evaluations from earlier ENDF/B versions also have this capability, but many do not. This message is intended to goad evaluators to improve things!
      groupr...compute self-shielded group-averaged cross-sections (4): GROUPR/conver (0)

      ```
      ---message from conver---cannot do complete particle production for mt= 91
                       only mf4/mf5 provided
      ```